We claim:

1.   A road wheel fuzzy logic control system for an automotive vehicle, comprising:

a fuzzy logic control unit receiving, a plurality of input signals, and generating a control output signal; and

a road wheel subsystem receiving said control output signal and generating an output feedback signal to said fuzzy logic control unit;

wherein said fuzzy logic control unit tracks an input signal under the effects of uncertainty and disturbance from said road wheel subsystem and vehicle dynamics and controls said effects of said uncertainty and disturbance and provides vehicle stability control.

2.   The road wheel fuzzy logic control system of claim 1, wherein said road wheel subsystem, comprises:

a motor drive receiving as input a second control output signal and generating a motor drive output signal;

said second control output signal comprising the sum of said control output signal and a second control input signal; and

a controlled plant receiving said second control output signal and generating a road wheel rate signal and a road wheel angle signal.

3.   The road wheel fuzzy logic control system of claim 1, wherein said fuzzy logic control unit uses a fuzzy logic strategy to control said uncertainty and disturbance.

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4.   The road wheel fuzzy logic control system of claim 1, wherein said input signal comprises a reference angle input signal.

5.   The road wheel fuzzy logic control system of claim 2, wherein said controlled plant comprises:

5   vehicle dynamics sensor array for sensing a dynamic variable of said road wheel subsystem;

said vehicle dynamics sensor array receiving said road wheel angle signal and generating a vehicle control output signal; and

an actuator-based road wheel dynamics receiving a vehicle

10   control input signal and generating said road wheel angle signal and said road wheel rate signal;

wherein said vehicle control input signal is the sum of said vehicle control output signal and said motor drive output signal.

6.   The road wheel fuzzy logic control system of claim 5, wherein

15   said dynamic variable comprises a yaw rate signal.

7.   The road wheel fuzzy logic control system of claim 5, wherein said dynamic variable comprises a vehicle speed signal.

8.   The road wheel fuzzy logic control system of claim 5, wherein said dynamic variable comprises a lateral acceleration signal.

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9.   The road wheel fuzzy logic control system of claim 2, wherein said road wheel subsystem further comprises a rate feedback compensator;

said rate feedback compensator receiving as input said road wheel rate signal and generating said second control input signal.

10.   The road wheel fuzzy logic control system of claim 2, wherein said fuzzy logic controller further comprises a vehicle stability control unit and a road wheel control unit;

said vehicle stability control unit receiving as input said dynamic variable and generating a vehicle stability control output signal; and

said road wheel control unit receiving as inputs an error signal and an error change signal and generating a road wheel control output signal.

11.   The road wheel fuzzy logic control system of claim 10, wherein said control output signal is the sum of said vehicle stability control output signal and said road wheel control output signal.

12.   The road wheel fuzzy logic control system of claim 10 further comprising an error calculator and an error change calculator;

said error calculator receiving as inputs said dynamic variable;

said error calculator generating said acceleration error input signal to said vehicle stability control unit;

said error change calculator receiving as input said error signal and providing said error change signal to said road wheel control unit;

wherein said error signal is equal to the difference between said road wheel angle reference signal and said road wheel angle signal.

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13.   The road wheel fuzzy logic control system of claim 10, wherein said vehicle stability control unit comprises a fuzzy logic controller and a gain scheduler;

said fuzzy logic controller receiving as input said dynamic variable and generating a first output signal; and

said gain scheduler receiving as inputs said first output signal from said fuzzy logic controller and said vehicle speed signal and generating said first control output signal.

14.   The road wheel fuzzy logic control system of claim 13, wherein said road wheel control unit comprises a second fuzzy logic controller and a second gain scheduler;

said second fuzzy logic controller receiving as inputs said error signal and said change error signal and generating a second output signal; and

said second gain scheduler receiving as inputs said second output signal from said second fuzzy logic controller and said vehicle speed signal and generating said second control output signal.

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15.   A method of implementing a fuzzy logic strategy for a fuzzy logic control system used in a road wheel control system, comprising:

generating a linguistic variable from a numerical input variable of a road wheel system;

generating a hypothesis based on said linguistic variable and a fuzzy rule;

generating a numerical output value from said hypothesis to control said road wheel system; and

generating said numerical input variable by applying said numerical output value to a road wheel and a vehicle dynamic signal.

16.   The method of claim 15, wherein said vehicle dynamic signal comprises a yaw rate signal.

17.   The method of claim 15, wherein said vehicle dynamic signal comprises a vehicle speed signal.

18.   The method of claim 14, wherein said vehicle dynamic signal comprises a lateral acceleration signal.